

Ischnochiton (Stenosemus) gallaecus spec. nov. (Mollusca, Polyplacophora), an Atlantic species from the Iberian Peninsula

Ischnochiton (Stenosemus) gallaecus spec. nov. (Mollusca, Polyplacophora), nueva especie para el atlántico ibérico

Pilar CARMONA-ZALVIDE*, Victoriano URGORRI** and Francisco Javier GARCÍA*

Recibido el 26-VII-2000. Aceptado el 20-XII-2000

ABSTRACT

A new species of the genus *Ischnochiton*, subgenus *Stenosemus* (Mollusca, Polyplacophora) from the Eastern Atlantic is described. The species has been named *Ischnochiton (S.) gallaecus* in honour of Galicia, a region located in the Northwest of the Iberian Peninsula. It was collected in A Quiniela (Galicia) (43° 17' 22" - 52°N; 9° 36' 38" - 45°W).

RESUMEN

Se describe una especie nueva del género *Ischnochiton* y subgénero *Stenosemus* (Mollusca Polyplacophora), del Atlántico Ibérico, denominada, *Ischnochiton (Stenosemus) gallaecus*. La especie está dedicada a Galicia, situada geográficamente en el Noroeste de la Península Ibérica. La localidad tipo es A Quiniela (Galicia) (43° 17' 22" - 52°N; 09° 36' 38" - 45° O).

KEY WORDS: Polyplacophora, *Ischnochiton (Stenosemus) gallaecus*, new species, description, taxonomy, Iberian Peninsula.

PALABRAS CLAVE: Polyplacophora, *Ischnochiton (Stenosemus) gallaecus*, especie nueva, descripción, taxonomía, Península Ibérica.

INTRODUCTION

The specimen was collected during the "Cangrexo I" campaign in A Quiniela (Galicia, NW Spain) at depths ranging from 753 to 880 m. The expedition was organised by the Animal Biology Department at the University of Santiago de Compostela. The specimen was found on bottoms having ferroman-

ganetic nodules with calcareous plaques, coal slag and small stones.

After reviewing the monographic studies by KAAS AND VAN BELLE (1985; 1987; 1990; 1994), who have compiled all the species described belonging to the genus *Ischnochiton* Gray, 1847, it was found that the specimen collected pre-

* Departamento de Fisiología y Biología Animal, Facultad de Biología, Universidad de Sevilla. Apdo. 1095 41080 Sevilla (Spain) e-mail: ffgarcia@cica.es

** Laboratorio de Zooloxía Maríña, Departamento de Bioloxía Animal, Universidade de Santiago de Compostela. 15706 Santiago de Compostela (Spain) e-mail: bavituco@usc.es

sented taxonomical features that are very different from the species described in previous papers. Therefore, in this article we describe what we consider to be a new species, *Ischnochiton (Stenosemus) gallaecus*.

This work has been partially supported by the project "FAUNA IBERICA IV" DGICYT/ PB95-0235).

MATERIAL AND METHODS

The specimen was collected in A Quiniela (43° 17' 22"-52" N; 09° 36' 38"-

45"W) (VII/1991) at 753 m depth during the Cangrexo I campaign. Samples were caught with traps used for the royal crab (*Chaceon affinis*). The specimen was separated using sieves of 5, 2, and 0.5 mm mesh.

The material collected was preserved in 70% alcohol. The structure of this species was studied by placing it in 10% KOH, which allowed for the separation of the shell valves, corpuscles scales and spicules of the girdle and the radula. The structures of the different parts were examined under the scanning electronic microscope (Philips XL-20).

RESULTS

Class POLYPLACOPHORA Gray, 1821
Order NEOLORICATA Bergenhayn, 1955
Suborder ISCHNOCHITONINA Bergenhayn, 1930
Family ISCHNOCHITONIDAE Dall, 1889

Ischnochiton (Stenosemus) gallaecus spec. nov.

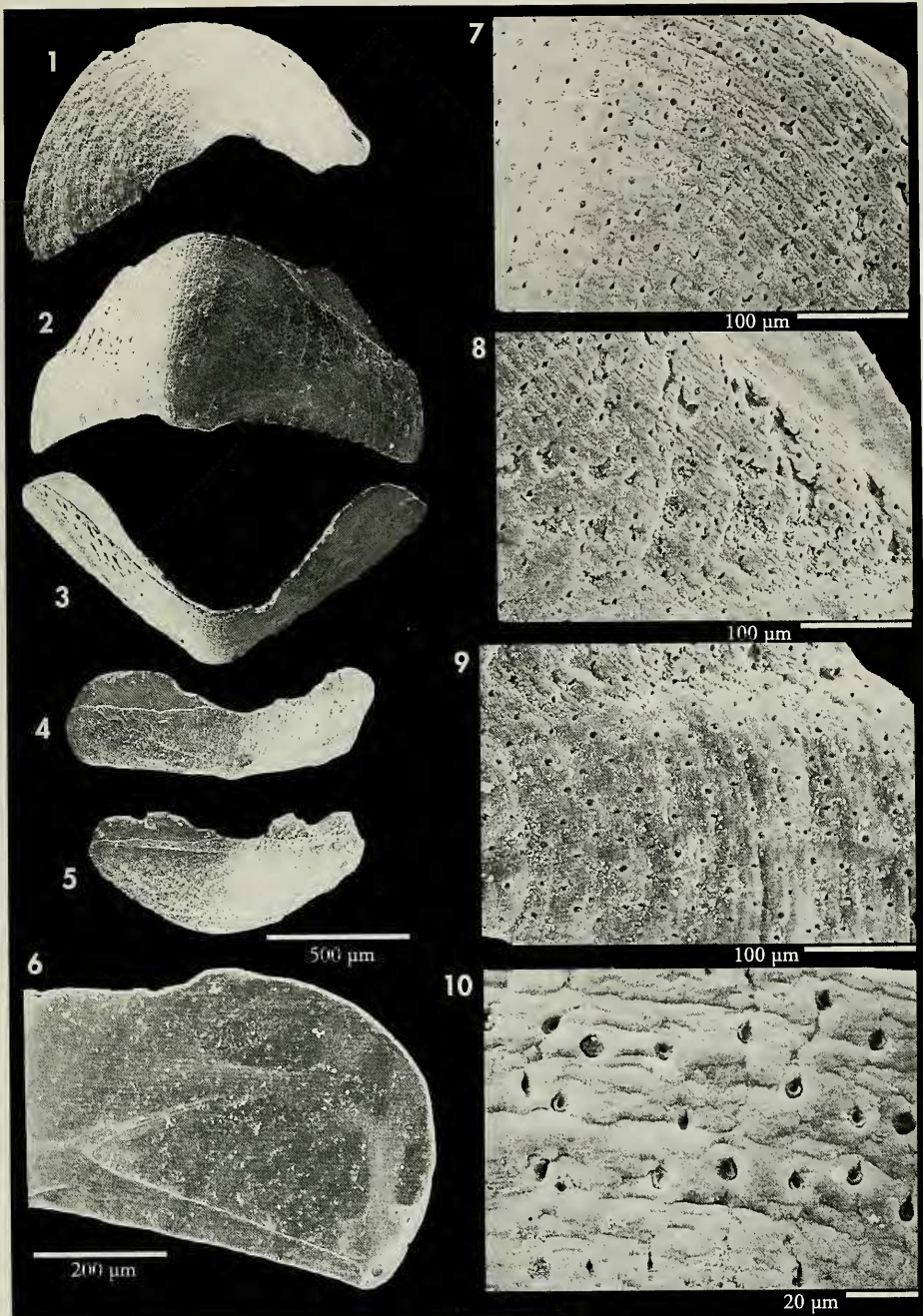
Type material: The only specimen collected is the holotype. Four valves and the radula were metallized as required by the methodology used to examine it with a scanning electronic microscope, and the rest of the specimen has been preserved in 70% alcohol. It is stored at the Museo de Ciencias Naturales de Madrid with code number MNCN 15.03/485. The type locality is A Quiniela (Galicia) (43° 17' 22"-52" N; 09° 36' 38"-45" W).

Derivatio nominis: This species is dedicated to Galicia, a region located in the Northwest of the Iberian Peninsula.

Diagnosis: The specimen is 2.5 mm long and 1.8 mm wide. It is oval-shaped with the cephalic area being flatter than the caudal area. The shell is strongly carinated at valves II, III and IV with well marked apices on the same valves. The ornamentation consists of rounded granules, which are more noticeable on the sides. These areas are slightly higher than the central area. The perinotum is made up of oval-shaped, imbricated scales with stems, having a smooth appearance, although they are slightly striated. The marginal fringe is not highly visible; among its spicules, we can clearly see several cylindrical spicules with stems. The uncinial plate of the major lateral tooth of the radula is tricuspid, with the central cusp being much longer than the lateral ones, al-

though there are three cusps, similar in size in the older area of the radula.

Description: Tegmentum. The specimen under study is white. The head valve is larger in size than the tail valve and has a semicircular anterior border and a triangular posterior border, with a considerably sharp apex (Fig. 1). The strong slope that originates at the valve tends to be convex. The intermediate valves decrease in size from the second to the seventh (Figs. 2-5). Despite being strongly carinated, they are rectangular shaped, with the exception of valve II. This valve has a convex anterior border, rounded sides, and at the apex the posterior borders converge forming a concave shape. The remaining intermediate plates have an almost straight anterior border, with a certain tendency



Figures 1-10. *Ischnochiton (Stenosemus) gallaecus* spec. nov. 1: valve I; 2: valve II; 3: valve IV; 4: valve V; 5: valve VIII; 6: articulamentum of valve VII; 7: ornamentation of the jugal zone; 8: ornamentation of the pleural zone; 9: ornamentation of the lateral area; 10: arrangement of aesthetes.
 Figuras 1-10. *Ischnochiton (Stenosemus) gallaecus* spec. nov. 1: valva I; 2: valva II; 3: valva IV; 4: valva V; 5: valva VIII; 6: articulamentum de la valva VII; 7: ornamentación de la zona jugal; 8: ornamentación de la zona pleural; 9: ornamentación del área lateral; 10: disposición de las estetas.

to be concave at the jugal sinus. The lateral borders are rounded and the posterior is straight with an apex that is not well-defined. The lateral areas protrude from the central area. The anterior border of the tail valve tends to be straight, although we can see that it has a slight tendency to become convex. One third of the posterior border is semicircular. The mucro is located in an anterocentral position and is not highly prominent, so that the slope that it creates is moderate and straight (Fig. 5).

The ornamentation is comprised of granules arranged quincuncially on the head valve, lateral areas of the intermediate valves (Fig. 9), and the postmucronal zone of the tail valve. The arrangement varies in the middle area, and they are less pronounced in the jugal area, although it is possible to see a tendency to form longitudinal chains without the granules actually touching each other (Fig. 7). In the pleural zone, however, where the granules are more visible, they are seen to overlap and the chains tend to come together (Fig. 8).

The aesthetes are arranged over the entire tegmentum and have a tendency to form straight lines, which vary in layout from longitudinal in the jugal zone of the central area to radial in the head valve, lateral areas, pleural zone and postmucronal zone. The mean diameter of the aesthetes is $4.96 \mu\text{m}$ (σ : 0.97), mean length between aesthetes in the same row is $21.21 \mu\text{m}$ (σ : 2.5) and the average separation between aesthetes in parallel rows is $14.96 \mu\text{m}$ (σ : 4.30) (Fig. 10).

Articulamentum (Fig. 6). White in color with a weak consistency. The teeth, which are slightly uneven, tend to protrude from the tail valve. The

apophyses of valve II to IV tend to be triangular, while valve V to VII become trapezoidal in shape. The insertion line formula is 11/1/11.

Girdle. The perinotum is similar in color to the tegmentum. It consists of imbricated, oval-shaped scales that have a small stem in the basal area, with 4 orifices (Figs. 15-17). In the dorsal area of the corpuscle, there are three slight striations (Fig. 16). They range in size from 50 to $90 \mu\text{m}$ on the largest axis. The mean stem diameter is $23.33 \mu\text{m}$ (σ : 1.36). If we observe the corpuscle sideways, it appears to have the shape of a boot, as the stem is located at one end. The ventral scales are arranged in overlapping lines. They are rectangular-shaped and feature two protuberances in the apical area of the scale (Fig. 18). They range between 30 and $40 \mu\text{m}$ in length and between 20 and $25 \mu\text{m}$ at the base. The marginal fringe is made up of cylindrical spicules with ribs that start at the base and come together at the sharp end of the spicule (Figs. 19, 20). Length is between 51 and $72 \mu\text{m}$. Among these spicules, we observed another type of spicules, which are smaller in number and larger in size. They are arranged on a narrow and elongated appendix, which makes them protrude even farther out from the marginal fringe. The spicules are lanceolate with three ribs that run parallel over the spicule. Length varies from 80 to $100 \mu\text{m}$.

Gills. They are classified as mero-branchial adanal with interspace. They start at the level of valves VI-VII and extend to the anus. They gradually increase in size and decrease at the last two valves. The number of gills on each side is 8.

(Right page) Figures 11-20. *Ischnochiton (Stenosemus) gallaecus* n. sp. 11, 2: radula; 13: uncinial plate of the major lateral tooth; 14: central tooth of the radula and first lateral tooth; 15: arrangement of the dorsal corpuscles on the perinotum; 16: dorsal corpuscles, dorsal view; 17: dorsal corpuscle, ventral view; 18: ventral scales, dorsal view; 19, 20: marginal spicules.

(Página derecha) Figuras 11-20. *Ischnochiton (Stenosemus) gallaecus* n. sp. 11, 2: rádula; 13: placa uncinada del diente lateral mayor; 14: dientes central y primer lateral; 15: disposición de los corpúsculos dorsales del perinoto; 16: corpúsculos dorsales, vista dorsal; 17: corpúsculo dorsal, vista ventral; 18: escamas ventrales, vista dorsal; 19, 20: espículas marginales.



11

20 μm



12

20 μm



13

10 μm



14

10 μm



15

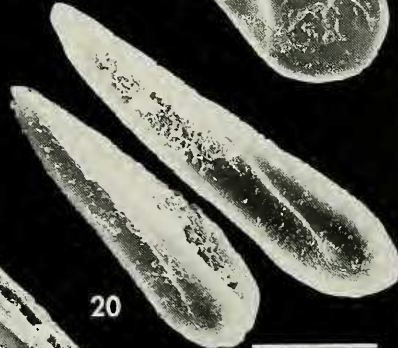
50 μm



16

17

20 μm



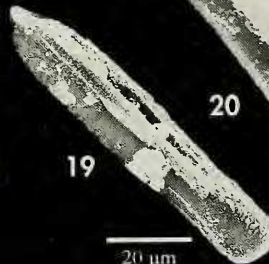
20

20 μm



18

20 μm



19

20 μm

Radula (Fig. 11). The central tooth of the radula is rectangular-shaped with a pronounced flexible border (Fig. 12, 13). The maximum length observed was 25 μm . The first lateral tooth, is longer, reaching up to 30 μm in length. The uncinal plate of the major lateral tooth is tricuspid, with the central cusp much longer than in the lateral teeth, although in the most utilized zone of the radula, the three cusps are similar in size (Fig. 13). The plumose tooth is small and does not

reach the uncinal plate of the major lateral tooth, The two small intermediate teeth, internal and external, as well as the last three, have the typical scale form (Fig. 11).

Biology: The only specimen of *Ischnochiton* (*Stenosemus*) *gallaecus* was collected at a depth of 752 m in strong currents. The animal was attached to a stone on bottoms with ferromanganese nodules, calcareous plaques and coal slag.

DISCUSSION

The specimen has been classified in the Family Ischnochitonidae given that the terminal valves have multiple fissures, the intermediate valves have a notch on both sides and it does not present pectinated insertion teeth. The "eyes" are not pigmentary; the apophyses are separated, and the perinotum is made up of scales.

It has been classified in the genus *Ischnochiton* because its tegmentum is sculpted by granules, it is twice as wide as it is long and on its jugal sinus there are no types of notches; nor does it have lines connecting the apophyses. It belongs to the subgenus *Stenosemus* since the perinotum scales do not have stems.

After reviewing the species that are classified in *Ischnochiton* (*Stenosemus*), we found no other species presenting similar traits. The specimen may be distinguished primarily because of the morphology of its body, which is wider in the cephalic area than in the caudal area and because valves II to IV are strongly carinated, while valves V to VII are subcarinated. As far as ornamentation is concerned, it is easily distinguishable from the species of *Ischnochiton* (*Stenosemus*) which have a clearly visible sculpture such as *I. (S.) exaratus* (G.O. Sars, 1878), *I. (S.) stearnsii* Dall, 1902, *I. (S.) vanbellei* Kaas, 1985 and *I. (S.) robustus* Kaas, 1991, since in *I. (S.) gallaecus* the granules are not very pronounced; they are quincuncially arranged and tend to form chains in the pleural zone. These characteristics also serve to differentiate it from species having a micro-

granulated tegmentum which do not tend to form chains such as: *I. (S.) albus* (Linneo, 1767), *I. (S.) chiversi* (Ferreira, 1981) and *I. (S.) vitreolus* Kaas, 1985. Our species differs from *I. (S.) substriatus* Kaas and Van Belle, 1990 as it has chains in both the jugal and pleural areas. It does not show clear striations in the corpuscles of the perinotum, which happens with *I. (S.) substriatus*. Besides, in this species, the uncinal plate of the major lateral tooth of the radula is bicuspid, with sharp apices, whereas that of *I. (S.) gallaecus* is tricuspid and its denticles are blunt. It differs from *I. (S.) delicatus* Kaas, 1991 because it has well-defined radial ribs in the lateral areas of the intermediate valves and head valve. It is also different from *I. (S.) perforatus* Kaas, 1990 due to the perforations found in the pleural zone of this species.

In comparison to the species collected in the same habitat, such as *Leptochiton* (*Leptochiton*) *gascognensis* Kaas and Van Belle, 1985, *L. (L.) compostellanum* Carmona and Urgorri, 1999, *Hanleya hanleyi* (Bean in Thorpe, 1844), *I. (S.) exaratus* (G. O. Sars, 1878) and *Connexochiton platynomenus* Kaas, 1979, it differs from the species belonging to the families Leptochitonidae and Hanleyidae and the species *I. (S.) exaratus*. To start with, it can be identified with a small specimen of *C. platynomenus*. However, this species shows an ornamentation formed by corpuscles quincuncially arranged, while those of *I. (S.) gallaecus* are not so marked and tend to form chains. The arrangement of aesthetes changes, as in *C. platy-*

nomenus they are located in the corpuscles and not lined up as in *I. (S.) gallaecus*. At the same time, the apophyses of *C. platynomenus* are interconnected. The central radular tooth is notably sharp and convexly curved, features not present in *I. (S.) gallaecus*.

Based on the comparisons made between *I.(S.) gallaecus* and the other species of the subgenus *Stenosemus* and *C. platynomenus*, and not having found any other that presented the same characteristics as the species described, we consider this to be a new species.

BIBLIOGRAPHY

- KAAS, P., AND VAN BELLE, R. A., 1985. *Monograph of living chitons. 2, Suborder Ischnochitonina, Ischnochitonidae: Schizoplacinae, Callochitoninae and Lepidochitoninae*. E.J. Brill, Leiden). 198 pp.
- KAAS, P., AND VAN BELLE, R. A., 1987. *Monograph of living chitons. 3, Ischnochitonidae: Chaetopleurinae, Ischnochitoninae. Additions to vols 1 and 2*. (E.J. Brill/ W. Backhuys, Leiden). 302 pp.
- KAAS, P., AND VAN BELLE, R. A., 1990. *Monograph of living chitons. 4, Suborder Ischnochitonina: Ischnochitonidae: Ischnochitoninae (continued) Additions to vols 1,2 and 3*. E. J. Brill/W. Backhuys, Leiden. 298 pp.
- KAAS, P., AND VAN BELLE, R. A., 1994. *Monograph of living chitons. 5 Suborder Ischnochitonina: Ischnochitonidae: Ischnochitoninae (concluded). Callistoplacinae; Mopalidae. Additions to vols 1-4*. E. J. Brill/W. Backhuys, Leiden. 403 pp.